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ABS RESIN COMPOSITION FOR CALENDAR PROCESSING
[Karendah Kakouyou ABS Jusi Soseibutsu]

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Specification

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1. Title of the invention: ABS resin composition for calendar processing

2. Claim

(1) An ABS resin composition for calendar processing comprises 100 wt. units ABS resin, 0.1~4 wt. units metal soap, and 0.05~3 wt. units fatty acid ester.

(2) An ABS resin composition for calendar processing comprises 100 wt. units ABS resin having heat resistance, 0.1~4 wt. units metal soap, and 0.05~3 wt. units fatty acid ester and 0.05~5 wt. units plasticizer with average molecule weight above 1000.

(3) An ABS resin composition for calendar processing according to claim 1 and claim 2, wherein the polymer compound having antistatic property in ABS resin is blended.

(4) An ABS resin composition for calendar processing according to claim 1 and claim 2, wherein the metal soap is barium, calcium, zinc, magnesium, [illeg.], or cadmium stearic acid salts.

(5) An ABS resin composition for calendar processing according to claim 1 and claim 2, wherein they are fatty acid ester, fatty acid lower alcohol ester, fatty acid poly alcohol ester, and fatty acid polyglycol ester.

(6) An ABS resin composition for calendar processing

¹Numbers in the margin indicate pagination in the foreign text.

according to claim 2, wherein the plasticizer with average molecule weight of above 1000 is epoxy soy bean oil, adipic acid group polyester or phthalic acid polyester.

3. Detailed explanations of the invention

[Industrial Field of Applications]

This invention relates to an ABS resin composition for calendar processing.

[Prior Art]

Generally, ABS resin has excellent mechanical properties, electric properties, and chemical resistance properties and is used in a wide range of usage. Especially, the material in the sheet form has been manufactured by the extrusion molding method and injection molding method. However, it is difficult to manufacturing ABS resin sheets by the calendar method due to the poor roll separation namely peeling off from the high /2 temperature roller surface of the ABS resin itself.

[Problems that the Invention is to Solve]

However, the calendar method is the method with the highest productivity on forming materials in sheet form. Therefore, in this field, it is strongly in demand for the availability of ABS resin composition with satisfactory molding property which can be molded and processed by the calendar method without losing its characteristics of ABS resin.

In addition, ABS resin generally has problems on heat properties (heat resistance temperature and heat deformation temperature) under the usage conditions of above 100~110°C.. In

recent years, it is very popular to develop heat resistance grade which endures temperature at above 100°C. However, the availability of ABS resin composition with excellent molding property which can mold the sheet state material according to the calendar processing is also strongly in demanding.

Moreover, in recent years, the ABS resin blended with polymer compound with permanent antistatic properties in ABS resin has developed. However, for this type of antistatic ABS resin, the availability of ABS resin composition with excellent molding property which enables molding of the sheet state material by calendar processing is also strongly demanding.

The present invention is designed to meet the aforementioned demand. Upon molding the material in sheet form by the calendar method, smooth surface can be formed without surface roughness (rough) and without roller separation. Namely, it is free from the occurrence of flow mark, without the poor appearance and changing the characteristics of the ABS resin itself. The purpose of the present invention is to provide ABS resin composition which enables manufacturing of sheet state material very economically by the calendar method.

[Means for Solving the Problems]

In order to attain the aforementioned purpose, first, for the first invention of the present invention, an ABS resin composition for calendar processing comprises 100 wt. units ABS resin, 0.1~4 wt. units metal soap, and 0.05~3 wt. units fatty acid ester.

Also, for the second invention, an ABS resin composition for calendar processing comprises 100 wt. units ABS resin having heat resistance, 0.1~4 wt. units metal soap, and 0.05~3 wt. units fatty acid ester and 0.05~5 wt. units plasticizer with average molecule weight above 1000.

For the ABS resin composition for calendar processing disclosed in claim 1 and claim 2, it is acceptable to blend the polymer compound having antistatic property in ABS resin.

As the metal soap stated above, barium, calcium, zinc, magnesium, [illeg.], or cadmium stearic acid salts can be used individually or in combination.

The addition amount of metal soap should be 0.1~4 wt.% to 100 wt.% ABS resin with preference of 0.5~3 wt.%.

If the addition amount of metal soap is less than 0.1 wt.%, the roller separation of the resin composition is poor, and since the resin composition adheres to the high temperature roller, it is impossible to form in a sheet form. In addition, if the addition amount of metal soap is above 4 wt.%, the sheet surface becomes rough and the surface texture will be rough, and the appearance of the sheet will be poor. Moreover, it is uneconomical due to the high cost of material fee.

Also, as the aforementioned fatty acid ester, fatty acid lower ester, fatty acid poly-alcohol ester, fatty acid polyglycol ester, etc. can be used. As the fatty acid lower alcohol ester used in here, in concrete, butyl stearate can be used. Also, as fatty acid poly-alcohol ester, in concrete, hardened castor oil

and others can be used. As fatty acid glycol ester, in concrete, ethylene glycol monostearate can be used.

The addition amount of the aforementioned fatty acid ester is 0.05~3 wt.% to 100 wt.% of ABS resin with preference of 0.5~2 wt.%.

If the addition amount of fatty acid ester is less than 1/3 0.05 wt.%, similar to the case of metal soap, roller separation of the resin composition is poor, and since the resin composition adheres tightly to the high temperature roller, it is impossible to form it into sheet form. In addition, if the addition amount of the fatty acid ester is more than 3 wt.%, the sheet surface becomes rough and the surface texture will be rough, and the appearance of the sheet will be poor. Moreover, it is uneconomical due to the high cost of material fee.

In addition, as the plasticizer with average molecule weight above 1000 stated in aforementioned second invention, there are epoxy soy bean oil, adipic acid group polyester or phthalic acid polyester. Upon selecting plasticizer, it is required to select the ones with good compatibility with resin. All the plasticizer indicated above show good compatibility with ABS resin. The addition amount of plasticizer is 0.05~5 wt.% to 100 wt.% resin with preference of 0.5~3 wt.%.

If the addition amount of plasticizer is less than 0.05 wt.%, the appearance of sheet is poor. The resin composition sheet will be sticky, roller separation will be poor, and it is impossible to form into sheet format. Also, if the addition

amount of plasticizer is above 5 wt.%, flow mark produces on the sheet surface, the appearance is poor, and it is uneconomical due to the high cost of material fee.

Also, The reason for selecting plasticizer with average molecule weight above 1000 is because the surface of the sheet state material will be free from [illeg.] and whitening phenomenon within this range.

As the polymer compound having antistatic property blended in ABS resin of the ABS resin composition for calendar processing in the aforementioned first invention and second invention, for example, it is preferred to use polyether ester amide disclosed in Tokkai S62-265340.

As for the polymer compound having antistatic property, (a) they are amino carbonic acid with carbon atom number above 6, or diamine and dicarbonic acid salts with carbon atom number above 6, (b) polyether ester amide comprising poly carbonic acid with average molecule weight of 200~6000 (alkylene oxide), polyether ester unit is defined as 95~10 wt.%, and excellent antistatic performance can be continued for a long period of time.

In general, since anion antistatic agent and cationic antistatic agent used as plastic antistatic agent has comparatively small molecule weight, when it is added to ABS resin, antistatic agent bleeds out onto the sheet surface during sheet formation, and it is not desirable due to antistatic performance reduces in the early stage.

[Working example]

Working example of the present invention will be described in the following.

Working example 1

Combine 0.3 wt. % barium stearate and 0.5 wt. % calcium stearate as metal soap, and 0.5 wt. % ethylene glycol monostearate into 100 wt. % ABS resin (heat deformation temperature: 81°C) available in the market. The mixture is mixed thoroughly with a [illeg.] mixer. After preparing ABS resin composition, the resin composition is formed into sheets in thickness of 0.5 mm and width of 500 mm under the roller temperature of 200°C by using four roller calendar molder in reversed L shape.

As a result, roller separation of the ABS resin composition is very good, and a sheet with excellent appearance smoothness without the occurrence of roughness on the surface can be molded.

Working example 2

Combine 0.3 wt. % barium stearate and 0.5 wt. % calcium stearate as metal soap, and 0.5 wt. % ethylene glycol monostearate, and 1 wt. % epoxy soy bean oil (product name: Adekasaiza-0-130, made by Adekaah gas chemical K.K.) into 100 wt. % ABS resin (heat deformation temperature: 113°C) available in the market. The mixture is mixed thoroughly with a [illeg.] mixer. After preparing ABS resin composition, the resin /4 composition is formed into sheets in thickness of 0.5 mm and width of 500 mm under the roller temperature of 210°C by using four roller calendar molder in reversed L shape.

As a result, roller separation of the ABS resin composition is very good, and a sheet with excellent appearance smoothness without the occurrence of roughness on the surface can be molded.

When epoxy soy bean oil is not added, it is possible to form into sheet shape, but the surface roughness occurs, and the appearance is very poor.

Working example 3

Combine 0.3 wt. % barium stearate and 0.6 wt. % calcium stearate as metal soap, and 0.8 wt. % ethylene glycol monostearate and 1 wt. % epoxy soy bean oil (product name: Adekasaiza-0-130, made by Adekaah gas chemical K.K.) into 100 wt. % ABS resin (heat deformation temperature: 90°C) blended with polymer compound with antistatic performance comprised with the aforementioned poly ether ester amide. The mixture is mixed thoroughly with a [illeg.] mixer. After preparing ABS resin composition, the resin composition is formed into sheets in thickness of 0.5 mm and width of 500 mm under the roller temperature of 210°C by using four roller calendar molder in reversed L shape, similar to working example 2.

As a result, roller separation of the ABS resin composition is very good, and a sheet with excellent appearance smoothness without the occurrence of roughness on the surface can be molded.

Antistatic performance is tested on the resultant sheet with a Honest meter, half life of withstand voltage is very short, excellent antistatic performance is stable and continued for a long period of time. With the permanent antistatic

performance, there is nearly no difference on antistatic effect between the outside surface and inside surface of the sheet ([illeg.], namely, final roller contact surface).

Tensile strength, Izod impact strength, mechanical property such as stretching, heat deformation temperature (thermal property), surface fixed resistance value (electric property) are tested on the ABS resin composition obtained in the aforementioned working examples 1~3. In addition, anti-chemical property test was also conducted. Any of the characteristic is nearly as same as the characteristic of ABS resin itself, and no significant change was observed.

[Effectiveness of this invention]

The ABS resin composition for calendar processing in the first invention of the present invention, as stated above, comprises 100 wt. units ABS resin, 0.1~4 wt. units metal soap, and 0.05~3 wt. units fatty acid ester. Therefore, during molding into sheet state by using the calendar method, roller separation is satisfactory, smooth surface can be formed without surface roughness (roughness). Thus, a material in sheet form can be produced extremely economically with the calendar method without changing the characteristics of the ABS resin itself and without occurrence of poor appearance such as flow mark.

For the ABS resin composition for calendar processing according to the second invention of the present invention, it comprises 100 wt. units ABS resin having heat resistance, 0.1~4 wt. units metal soap, and 0.05~3 wt. units fatty acid ester and

0.05~5 wt. units plasticizer with average molecule weight above 1000. Therefore, ABS resin composition material in sheet form with excellent heat resistance grade and smooth surface can be produced extremely economically with the calendar method without changing the characteristics of the ABS resin itself and without occurrence of poor appearance.

By blending the polymer compound having antistatic property in ABS resin in ABS resin of the ABS resin composition for calendar processing according to the first invention and second invention of the present invention, ABS resin composition in sheet form can be economically produced with the same calendar method nearly without difference on antistatic effect on the front and back surface and with excellent permanent antistatic properties.